flap is necessary. This provides a respiratory epithelium to cover the raw area and to decrease scar reformation. The morbidity and mortality in our patients with these techniques have been no greater than those of direct laryngoscopy or bronchoscopy.

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Complications of Injectable Collagen

THE USE OF collagen as an injectable substance for superficial soft tissue augmentation remains relatively new. As "Zyderm Collagen Implant" it underwent the Food and Drug Administration's clinical investigative protocol between September 1979 and August 1981. During this interval, of nearly 10,000 subjects given skin tests, 3% had positive responses. Most reactions were at the test site, although a few persons had arthralgias, flu syndromes or myalgias. Of 5,109 patients subsequently treated, 1.3% experienced adverse reactions despite reports of negative skin test results.

Our experience has shown the same 3% positive skin tests. These reactions have ranged from subtle and transient erythema or induration to pronounced local changes that persisted for many months. Nearly all adverse responses to collagen are manifest within the first two implantations. To avoid complications, each patient should have a skin test twice, with a month-long interval in between. In addition, the patient should be observed closely and questioned regarding any adverse effects.

Annoying but minor reactions follow treatment. Initial erythema and swelling may persist for several hours to days in susceptible persons. Superficial bruising occurs after 10% of treatments and small pustules at needle sites may occur the day after treatment. These can be minimized if the collagen is given by a slow superficial injection after the injection site has been thoroughly cleaned with alcohol and a mild steroid cream applied after injection.

Moderate reactions include visible or palpable lumpiness lasting for from weeks to months and acute or intermittent local edema. The lumpiness is related to the injection technique used and can be avoided with increased experience.

Severe reactions are those related to delayed hypersensitivity. The resulting red-to-purple raised welt is exceedingly difficult to cover, may last for months and is distressing and depressing to patients. The incidence of severe reaction is now well below 1% of those treated, especially if the skin test is done twice. Unfortunately, we cannot predict who will react this way, and no safe and effective treatment exists. The single permanent and disastrous complication thus far reported was a unilateral loss of vision in a patient during a glabellar injection.

One final problem with injectable collagen is the duration of its effectiveness. A significant number of patients will benefit for only 6 to 12 months from a single injection. Therefore, all patients should be informed that they might need yearly injections to maintain a satisfactory result.

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